Enhancing the Performance of Transmission in Cloud Based Multimedia using Fault Tolerance Technique

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Abstract - An analyze to increase the speed of transmission , task arrival rate, response time, distribution probability of the response time Specifically the response time of the cloud base multimedia is structured and the fault tolerance in multimedia is analyzed thereby distribution probability is derived imposing the retrying tasks arrival rate are analyzed taking innumerable examples. Probability distribution of the response time is derived using metric that reflects in a better way the requirements of the customers. Analyze carried out on the percentage of response time that characterizes threshold response time. Inter relationship among the number of service resources, service rate, system performance, task. were also analyzed Retrying for fault tolerance is compared with the check- pointing technique. In the competitive world of wireless communication and the growth of multimedia services like real-time conferencing, photo- sharing ,video-on- demand , editing, image search is on high demand for cloud computing. The slogan of access to serve billions of people those who use mobile and wireless transmission on any device, anytime, anywhere. The cloud computing emerged to facilitate the execution of complicated multimedia tasks and are able to store and process multimedia application and distribute them without any discrepancies thereby eliminating the complexity of software installation and maintenance in users devices.

Keywords:- *Multimedia systems using cloud computing , percentile of response time, performance evaluation, retrying technique. Quality of service.*

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I. Introduction

With the use of cloud based multimedia we can organize a. third party entities to deliver the resources as metered services.. The Users can use centralized cloud computing facilities instead of local computers thereby pay only for the resources used by their application instead of paying for the entire setup of equipment. By the use of the techniques such as retrying for fault tolerance , check-pointing in the cloud computing reduce the cost of tasks, centralized storage, processing network bandwidth and provide much more efficient computing[1]-[3].Based on the advantages of cloud computing many large companies like Wipro, Infosys, and many other IT companies [4],[5],[6], and major MNC was attracted and paying more attention to reduce their work load and they are more actively involved in the development of cloud computing based on multimedia application.

Technological advancement in wireless communication and the rapid growth of multimedia services like real-time conferencing, photo- sharing ,video-on- demand , editing, image search is on high demand to serve millions of mobile and internet users to acess on any particular device ,anytime, anywhere. for cloud computing [7]-[9]. Cloud computing has emerged to facilitate the users. and are able to store more data and process application in the cloud based multimedia system and distribute without any much delay and render services without any loss of data thereby eliminating the burden of multimedia software installation and maintenance in users device. Figure .1 represents the structure for service providers [10]-[14].

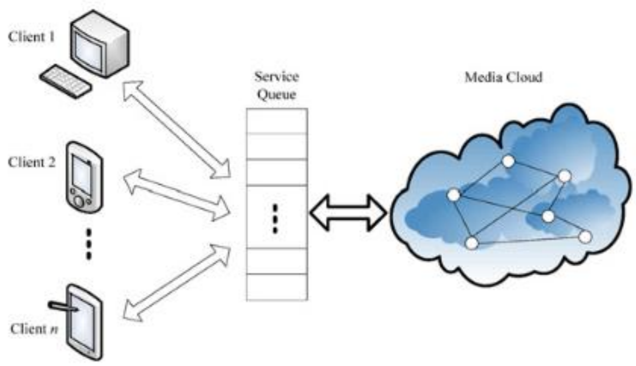

Fig. 1.Multimedia cloud service structure

The main aim of this paper is not to compromise on the quality of service and the customer should be given guarantee for the task[12]-[14] So any delay in rendering services should not be happened ,otherwise the multimedia services fails. They should follow a strict deadline for their request services in time particularly for the services like real-time conferencing., photo- sharing, video-on- demand , editing, image search. The main motto of this paper is not only to deliver the task in time at the same time it should be in a ready state in dealing with failures of any nature. . with respect to quality of service is the reliability and that is one important aspect which provide the requested service successfully[15]. One of the important aspects of cloud computing If Cloud service provider service is low the faith on the service provider will reduce drastically and the user will suffer failures frequently and lose faith . Taking all the aspect into consideration to improve the services for reliability different techniques for fault tolerance are to be used like the below mentioned reliability techniques [16]:

Retrying: The failed task is retried on the same resource.

Alternate resource: The failed task is retried on another resource.

Check-pointing: The failed task resumes processing from the last saved checkpoint instead of from the beginning.

Replication: Different replicas of the same task are processed on different resources simultaneously. All the techniques which are implemented are having merits and demerits. One such simplest technique is retrying that is given more importance and it is used.

Among the various techniques alternate resources and retrying techniques are not time-efficient, in case if the task fails it has to be restarted from the beginning .The more efficient check-pointing technique is considered to be more efficient but it takes lot of memory space i.e. storage space because of its check-points . The most important aspect of cloud based service is how much fast it can provide the requested service . If the requested service is delayed the users will experience a lengthy service time repeatedly[16]-[19] , the response time is a very important factor which can be defined as the time taken when the user submit the request to the time the result is obtained [20]. An example will clarify the simple solution if the customer requirement is 75 % of work to be completed in 5 minutes , if the average time of response is 75% for 7 minutes this does not satisfy the customer . So different reliability performance has been analyzed in this literature.

Environmental monitoring for cloud based multimedia system reliability was analyzed and simulated[21]. The QoR was defined and a new accounting was proposed to improve the reliability[22]. Then comes the concept of scalability and performance were evaluated for SaaS in cloud computing multimedia systems[23] for highly flexible applications[24]. For computing various tasks scientific computing with general performance evaluation was taken into consideration and performance evaluation was analyzed using fault tolerance[25].

The Performance of cloud service by considering the impact of fault tolerance technique a (PDF) Probability Density Function was derived for the response time. As per the analysis detail of various evaluation of the performance of check pointing technique and retrying technique no work has been done in the cloud computing multimedia system. In this paper we derived probability density function (PDF) for response time taking into consideration the retrying technique for the multimedia system using cloud computing and using metric of percentage for response time. The combination of different parameters were taken into consideration and analyzed. The continuity of this paper is described in section II in the cloud based systems.

Section III: Task scheduling subsystem of the task are analyzed and modeled.

Section IV : Processing of the task subsystem is done.

Section V : In this section the performance analysis results for the whole multimedia system based on cloud computing is performed .

Section VI: Comparative analysis of the different types of fault - tolerance technique with the cloud computing using multimedia is done.

Section VII: Conclusion of the complete module is done .

II. Description of the system

For example when a User sends a tasks of to the cloud based multimedia systems The task first enters the CMS that verify the task /request and then the request may be divided into many subtasks. Then in the queue system the sub tasks are awaiting for the scheduled time .But there are many multiple schedule that sends these tasks to Virtual nodes (VN). there it is processed The cloud system being a flexible / Elasticity the total number of virtual nodes seems to be infinity.

The VNs in order to improve the reliability of the service adopt to apply the fault tolerance technique like retrying which reprocess from the beginning when the failure involved during. the processing of the task. The submission time which is defined as the time elapsed from completing the task to the user receiving the final outcome of the results which are not analyzed or studied in this paper. If we view this in a different way the users request task response time consists of the time used to scheduling and processing time. Ultimately the entire cloud computing multimedia system is separated into two categories of subsystem, one is processing system and the other is scheduling system. Analysis of the performance of the two category subsystems like scheduling system and the processing system is done in this section III and Section IV.

Section V. Complete analysis report in terms of response time for the whole system of the cloud based multimedia is given in this section. We take in to account the number of retries of the whole task and subtask without any specific limitation to retries.

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III. Task Scheduling Subsystem

A. Sojourn Time Modeling

It consists of Queue and multiple homogenous schedulers servers We take into consideration the Poison process with standard rate and the service time of each scheduler is distributed with service rate of each scheduler service time of each scheduler is exponentially distributed with service rate μ S . Let S (S≥1) represents the number of schedulers and N represents the capacity of the queue. The scheduling subsystem can then be modeled using M/M/S/N queuing model.

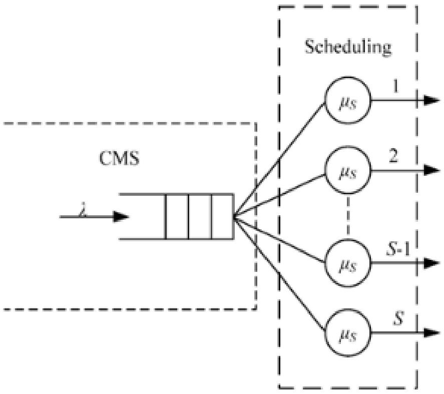

Fig.2.Scheduling subsystem model

Existing work has shown that the infinite buffer model M/M/S is a very good approximation of a finite buffer system M/M/S/N, even for moderate buffer size [2].
Therefore, in this paper we evaluate the performance of the scheduling subsystem using an M/M/S model as shown in Fig. 2. To discriminate from the response time for the entire system, the response time for the scheduling subsystem is referred to as sojourn time in the subsystem. The sojourn time denoted by T S, is the time elapsed from the task entering the queue to the task completing service, i.e., being dispatched.

B. Percentile of Sojourn Time

For the scheduling subsystem, there are three factors that affect the sojourn time: arrival rate λ, service rate μ S and number of schedulers S.
In this section, we study the relation-ships between these parameters and the percentile of sojourn time. Three important questions are discussed and answered.
1) What is the minimal number of schedulers S for a given arrival rate and a given service rate to finish their services within a desired target time with cent percent guarantee?.

2) The minimal service rate of S for a given arrival rate and a given number of schedulers should be calculated with a certain percent of task completing their services within the desired time targeted. this calculation gives the relationship between percentile of the sojourn time and the number schedulers S.
Given ϰ = 10(s^{-1}), $T^D{}_S$=0.6(s),μs=5(s^{-1}),

The above two statements are based on the assumptions that the scheduling subsystem model is stable. therefore the given number of scheduler should be larger than the given service rate. According to the result shown in Fig 3, it can be guaranteed that 90% tasks can finish their services in 0.6 s. the number of scheduler S should be more than 80%, however finishing the task service in 0.6s. when S = 3.
Note that increasing the number of schedulers S when S > 4 does not increase the percentile of response time significantly since almost entering the queuing system can receive services immediately. That is, there are always schedulers available for providing services and the queue is always empty.

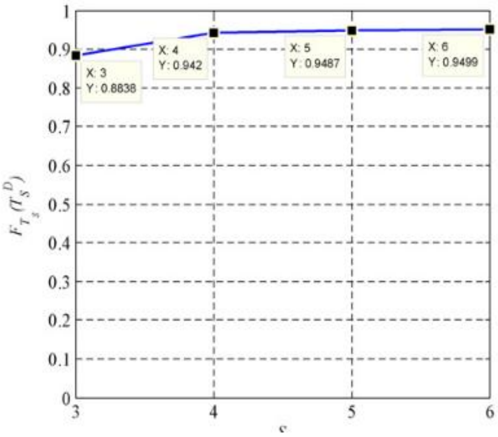

Fig.3.Percentile of Sojourn time of different S

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Given ϰ = 10(s^{-1}), $T^D{}_S$=0.6(s),μs=5(s^{-1}), this proves the relationship between percentile of sojourn time and service rate of S. this shows that the service is larger in the order of (s-1) and the sojourn time is 90% less than 0.6s and larger than 5.211(s-1) in order that 95% of tasks can scheduling subsystem within 0.6s. Given TDS= 0.6 (s),S=4,æS=5(s)
Fig.5 demonstrates the relationship between percentile of sojourn time and arrival Rate ? Fig. 5 shows that for the schedulers with service rate 5 (s-1), the maximal arrival rate is 14.09 (s-1) which is less than the sojourn time by 90% within 0.6 s and this can be guaranteed when arrival rate less than 15.59 (s−1).

IV. Task Processing Subsystem

A. Processing Time Modeling

Now for processing, assume that the multimedia task is assigned to the node. The processing time without failure is denoted by ç ,is decided by the workload of task (denoted by l) and the processing speed of node (denoted by s). Then the required processing time is

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τ = l/s

In retrying technique, the processing time depends on the numbers of failure and the time point when each failure happens.

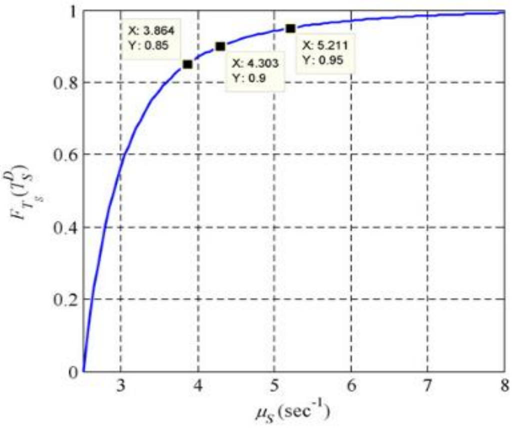

Fig.4.Percentile of sojourn time for different µs

The failure time consumed to complete a task done in processing round is independent of other failure time taken by the individual rounds. The processing time is simply denoted by c. At time T1 if only one failure occurs less than 0, then the process is successful in (N+1)th processing round, the processing time considering the retrying

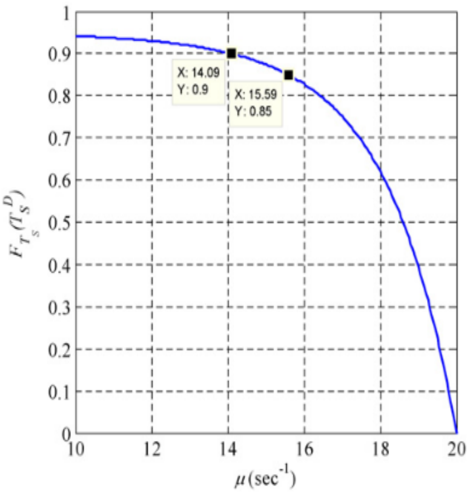

Fig.5 Percentile of sojourn time with ʎ

effects, denoted by Tp, is Tp=T1+T2+...+TN+ç. Where Ti (i=1,2, ..., N) is the processing time for the ith processing round. We assume that the time for restarting another processing round after a failure is small enough and can be ignored.

B. Percentile of Processing Time

In the processing subsystem, the percentile of processing time is affected by the failure rate of the task. We answer the following question in this section: what is the maximal failure rate ? The processing time taken for the task to complete should be done within the stipulated time. Given ç= 2000 (s) and TDP= 10000 (s). Fig. 6 demonstrates the relationship between percentile of processing time and From Fig. 6, we can see that 90% of tasks can finish processing in the processing node within 10000 (s) when the failure rate s-1). To guarantee 95% of tasks finish their processing within 10000 (s), the failure rate should be less.

V. Service Response Time

The service response time is the time elapsed from when a multimedia task is submitted to the cloud until the time when the final output is received.

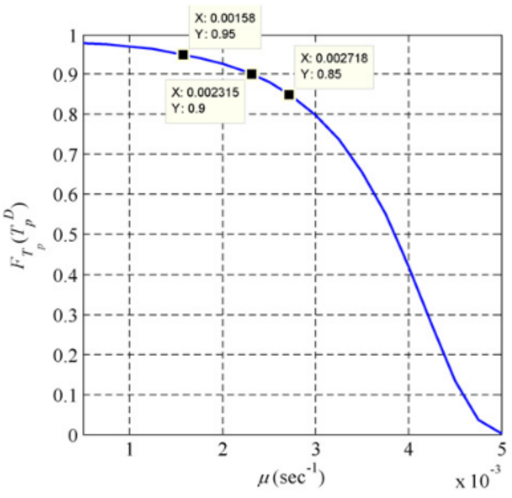

Fig .6 Percentile of processing time with failure rate

Since the submission time and the return time are ignored. The response time, denoted by Tr, can be evaluated as the summation of the sojourn time in the scheduling subsystem and the processing time in the processing subsystem, that is Tr=TS+Tp(21). The pdf of response time is the convolution of the pdf of the sojourn time and the pdf of the response time Given the number of schedulers S = 4, service rate of each scheduler S=5(s-1), arrival rate of tasks ?=10(s-1), and required processing time s), Figs. 7 and 8 show the pdf and cdf of the response time with different task respectively.

VI. Comparisons

In this section, the performance of percentile of response time for cloud systems using different fault-tolerant techniques is been compared with the check pointing technique and retrying technique. All parameters are compared for the same two systems. Certain mentioned values used for selecting the parameters. Given the number of schedulers S = 4, service scheduler S =5(s-1), arrival rate of tasks s-1), and required processing time ç= 2000 (s), failure rate of tasks ?p= 0.0015 (s-1), desired response time. For a cloud computing systems, using retrying technique the percentile of response time with different recovery rates is shown in Fig.8for the above parameters given. Fig. 9

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illustrates that 50.92% of tasks can finish their processing using the retrying technique within 10000 (s). The performance is worse when pointing technique is used rather than retrying technique. and the recovery rate is 0.0003576 smaller. However, more tasks can finish processing if the recovery rate is larger than 0.0003576 (s-1) when the check-pointing technique is used.

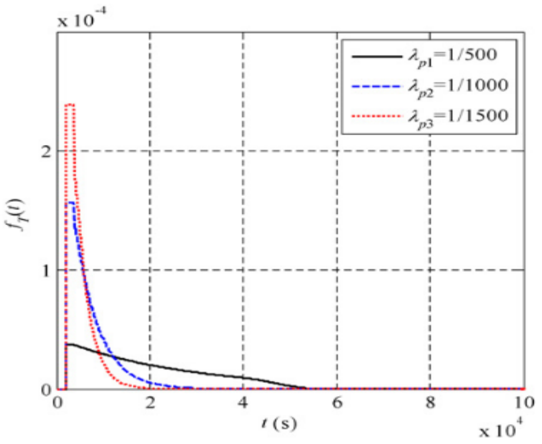

Fig.7.pdf of the service response time

Fig. 8 shows the percentile of response time with different recovery rates for cloud computing systems using the check-pointing technique and the percentile of response time when using the retrying technique. Note that the percentile of response time of the cloud computing system using the retrying technique stays constant given the above parameters

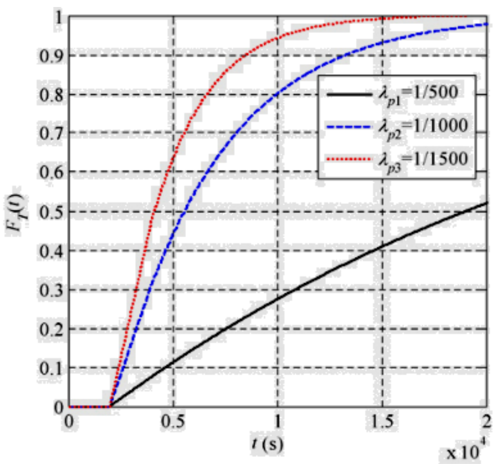

Fig.8. cdf of the service response time

Fig. 9 illustrates that 50.92% of tasks can finish their processing within 10000 (s) when the retrying technique is used. When using the check-pointing technique, the performance is worse than that of the system using the retrying technique if the recovery rate is smaller than 0.0003576 (s−1).

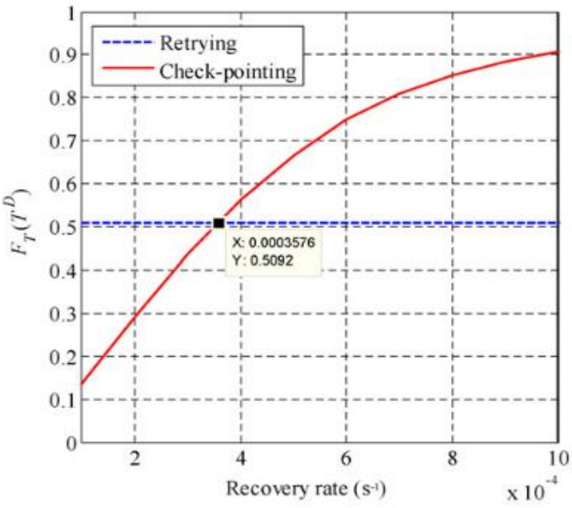

Fig.9. Comparison under different recovery rates

However, more tasks can finish processing if the recovery rate is larger than 0.0003576 (s−1) when the check-pointing technique is used

VII. Conclusion

In this paper, we conducted an analysis for the performance cloud-based multimedia using retrying fault technique for the cloud-based multimedia systems. The sojourn time and percentile of the sojourn time for the scheduling subsystem, the processing time and percentile of the processing time in the

processing subsystem considering effect of the retrying technique, and the overall response time of the cloud service were modeled and analyzed. The effects of different design parameter values on the system performance were also investigated using numerical examples. Specifically, the relationship among the arrival rate of tasks, service rate of each scheduler, number of schedulers and the percentile of sojourn time in the scheduling subsystem was studied. We also investigated the relationship between the failure rate of each processing node and the percentile of processing time. The performance of cloud services using the retrying fault recovery technique was compared with that of cloud services using the check-pointing technique. The comparison results demonstrate that the performance of a cloud service using the retrying technique can be better or worse than that of cloud services using the check-pointing technique depending on the required processing time, failure rate, and recovery rate of the check-pointing technique. Our research opens a new vista in the field of the reliability to improve media cloud system performance

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